FORM PTO-1390 (REV 12-29-99)	U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 0745/62947/NHZ
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S APPLICATION NO. (if known, see 37 CFR 1.5) **09/646199**

INTERNATIONAL APPLICATION NO. PCT/DE00/00129	INTERNATIONAL FILING DATE 14 January 2000	PRIORITY DATE CLAIMED 14 January 1999

TITLE OF INVENTION
METHOD FOR AUTOMATICALLY DESIGNING CELLULAR MOBILE RADIOTELEPHONE NETWORKS

APPLICANT(S) FOR DO/EO/US
Jurgen CLEMENS, Dr. Wolf MENDE and Dr. Norbert SCHULTZE

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.

2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.

3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).

4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. [ ] A copy of the International Application as filed (35 U.S.C. 371(c)(2))

    a. [ ] is transmitted herewith (required only if not transmitted by the International Bureau).

    b. [ ] has been transmitted by the International Bureau.

    c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).

6. [X] A translation of the International Application into English (35 U.S.C. 371(c)(2)).

7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))

    a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).

    b. [ ] have been transmitted by the International Bureau.

    c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.

    d. [ ] have not been made and will not be made.

8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.

12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

13. [X] A FIRST preliminary amendment.

    [ ] A SECOND or SUBSEQUENT preliminary amendment.

14. [ ] A substitute specification.

15. [ ] A change of power of attorney and/or address letter.

16. [X] Other items or information: A copy of the International Application, as published, including International Search Report and translation thereof, Express Mail Certificate of Mailing dated September 14, 2000, bearing Label No. EJ900 851 149US.

U.S APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
09/646199	PCT/DE00/00129	0745/62947/NHZ

17. [X] The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO · · · · · · · · **$970.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO · · · · · · · **$840.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO · · · · · · · · · **$690.00**

International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) · · · · · · · · · · **$670.00**

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) · · · · · · · · · · · · · · · · **$96.00**

	CALCULATIONS PTO USE ONLY
ENTER APPROPRIATE BASIC FEE AMOUNT =	$970.00	

Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)). — $0

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	6 - 20 =	0	X $18.00	$0	
Independent claims	1 - 3 =	0	X $78.00	$0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $260.00	$0	
TOTAL OF ABOVE CALCULATIONS =				$970.00	

Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also by filed (Note 37 CFR 1.9, 1.27, 1.28). — $

SUBTOTAL =	$	

Processing fee of **$130.00** for furnishing the English translation later than [ ]20 [ ]30 months from the earliest claimed priority date (37 CFR 1.492(f)). + — $

TOTAL NATIONAL FEE =	$	

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property + — $

TOTAL FEES ENCLOSED =	$970.00	
	Amount to be refunded:	$
	charged:	$

a. [X] A check in the amount of $ 970.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-3125 . A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

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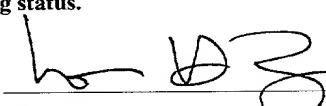
SIGNATURE

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25,385
REGISTRATION NUMBER

Form PTO-1390 (REV 12-29-99) page 2 of 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants   :   Jurgen CLEMENS, Dr. Wolf MENDE and Dr. Norbert SCHULTZE

Serial No.   :   Not Yet Known

Filed   :   Herewith

For   :   METHOD FOR AUTOMATICALLY DESIGNING CELLULAR MOBILE RADIOTELEPHONE NETWORKS

Assistant Commissioner of Patents
BOX PCT
Washington, D.C. 20231
Sir:

PRELIMINARY AMENDMENT

Please delete the claims, and substitute new claims 1 through 6, as follows:

-- 1.   A method for automatically designing cellular mobile radio telephone networks, wherein, from existing planning data of implemented, planned or abstract cellular mobile radio telephone networks or subnetworks and the space-related data of their planning areas and the space-related data of a new planning area, a design of the cellular mobile radio telephone network or subnetwork for the new planning area is automatically generated by processing the relations between the space-related reference and planning data and application of coordinate and angle transformations to the site coordinates of the base stations and main beam directions of the antennas of the base stations of the reference data.

2.   A method according to claim 1, wherein the quality of the network design is assessed by quantifying the relations between space-related reference and planning data.

3. A method according to claim 1, wherein the space-related planning data are acquired, stored, tested and processed.

4. A method according to claim 1, wherein the space-related planning data are represented as one or multi-dimensional features and/or parameters and are kept stored in a database.

5. A method according to claim 1, wherein the space-related and network-related reference data are kept stored in a database and are represented as one or multi-dimensional features and/or parameters.

6. A method according to claim 1, wherein, without necessary human intervention, for a mobile radio telephone network or subnetwork (N1) to be planned on a geographic area (1) a real or abstract mobile radio telephone network or subnetwork (N2) on a real or abstract geographic area (6) is changed in the space-related parameters, site coordinates and antenna main beam directions and on the geographic area (1) is substituted in the subnetwork (N1) to be planned by coordinate transformation of the geographic longitude, latitude and rotation with respect to the zero meridian at the precise instant when the features of the space-related data of the geographic areas (1) and (6) are equal or are said to be equal in accordance with a particular criterion. --

REMARKS

The claims pending in the PCT application have been amended to eliminate multiple dependent claims. New claims 1 through 6 are presented for examination.

An early and favorable examination on the merits is earnestly solicited.

Respectfully submitted,

Dated: September 14, 2000   By: _____
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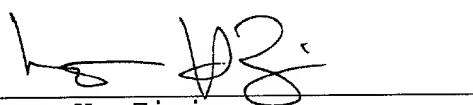
Method for automatically designing cellular mobile radio telephone networks

Description

The present invention relates to a method for automatically designing cellular mobile radio telephone networks in accordance with the features of the preamble of patent claim 1.

It is the aim of practical radio network planning for designing cellular mobile radio telephone networks to offer the highest possible quality of service to the largest number of subscribers and it has to be based on predetermined boundary conditions such as, for example, wave propagation characteristics, availability of fixed transmitter sites, useable frequency spectrum, traffic volume to be expected, traffic distribution etc.

In the initial period of mobile radio telephony, the radio network planning was essentially performed manually by a radio network planner. Due to the increase in size and efficiency of networks, efforts were aimed at automating more and more substeps of the planning process. This required powerful computers which have become generally available only in recent times. Known methods for the automatic design,

automated planning and/or optimization of cellular mobile
radio telephony networks taking into consideration the
geographic conditions and/or the behavior of subscribers
within the planning region, which have been implemented or
are in development, are based on the totality or on parts of
the following general method which is shown diagrammatically
in Figure 4.

In a first step, the space-related data of the planning area
are preprocessed. Space-related data are understood to be,
for example, the space-related radio traffic distribution to
be expected, the radio traffic density, topographical data,
traffic routes (roads, railway lines) etc. In Figure 4, a
planning area 1 considered is shown diagrammatically, which
is subdivided into individual grid squares 2. For each grid
square, a predicted traffic density, i.e. a traffic density
to be expected, is shown. The darker the gray coloration
shown, the higher the expected traffic density.

In a second step, the space-related data are represented as
condensed and normalized features which are shown as
normalized density points 3 in the example. The condensed and
normalized features are processed by means of algorithms for
calculating the geographic position of the sites for the base
stations 4 of the mobile radio telephone network.

In a third step, finally, the sites of the base stations 4
and of the condensed normalized features are processed by
means of algorithms for calculating the parameters of the

base stations of the mobile radio telephone network. These parameters are, among others, transmitter power, frequencies, antenna parameters, etc. The proposed coverage areas 5 of the individual base stations 4 are shown, for example, at the bottom in Figure 4.

This results in a rough planning model which now must be optimized by means of manual work. The example still contains gaps between coverage areas 5 of base stations 4 which must be closed by further planning measures such as, e.g. setting up additional base station sites, increases in transmitter powers etc..

The known methods can either only be used for part-tasks of the automatic network design or contain fundamental problems:

As yet, no automatic method is known which, by means of its application, generates a complete network design, the quality of which is comparable to results of manual radio network planning.

Furthermore, no automatic method is known which, by means of its design, can assess the quality of the results of the automatic network design in comparison with a network or subnetwork planned manually or in operation and can demonstrate these quality levels in the result.

No automatic method is known which, by means of its design, can be applied for different mobile radio telephone standards (GSM, DCS 1800, CDMA, analogue standards, future standards) in parallel and without changing the operations.

No automatic method is known, either, which, by means of its design, achieves the reuse of complete manual planning results and planning experience for new mobile radio telephone networks to be planned by means of automatic operations.

No automatic method is known which, by means of its design, takes into consideration the particular features of different system technologies in the design of networks or subnetworks.

Furthermore, no automatic method is known which, by means of its design, achieves the design of mobile radio telephone networks which combine different mobile radio telephone standards (e.g. GSM 900 and DCS 1800).

The present invention is based on the object of proposing a method for automatically designing cellular mobile radio telephone networks which generates a complete network design, the quality of which is comparable to results of manual radio network planning.

This object is achieved by the characterizing features of
claim 1.

The invention is based on a method which automatically
generates a design of the cellular mobile radio telephone
network or subnetwork for the new planning area from
previously produced planning data of implemented, planned or
abstract cellular mobile radio telephone networks or
subnetworks and the space-related data of their planning
areas (reference data) and the space-related data of a new
planning area (space-related planning data) by processing the
relations between the space-related reference and planning
data and application of coordinate and angle transformations
to the site coordinates of the base stations and main beam
directions of the antennas of base stations of the reference
data.

An significant advantage of the method according to the
invention is that by this means a realistic complete network
design (complete network data and network parameters), which
can be used directly for quantification of the investment and
planning expenditure and for other planning processing by the
user is generated automatically.

Furthermore, the networks or subnetworks generated are
automatically assessed by means of quality levels by the
method described. This ensures that transparent information

on the planning outlay of the further processing of the
network design are provided to the user of the method.

A further advantage consists in achieving a selective,
automated reuse of manual planning results and the normalized
storage of know-how. This leads to a considerably reduced
work- and computing load.

Furthermore, the method according to the invention achieves a
significant quality improvement of the "synthetic network"
function of radio network planning tools by taking into
consideration the space-related data of the planning area
(e.g. a synthetic network adapted to traffic).

Furthermore, the method described provides for a new class of
analysis functions of a radio network planning tool in that
network areas with similar or corresponding space-related
conditions can be automatically compared.

In addition, the method according to the invention achieves
network designs for different mobile radio telephone
standards and system technologies by using identically
structured reference data of the preproduced networks without
changing the operations.

To prepare and carry out the method described, operations,
activities and methods are used which are known to an expert

and, therefore, will not be explained in greater detail here.
These are, e.g.:

- the acquisition, storage, testing and processing of
  space-related grid and/or vector data,
- the calculation of one- or multi-dimensional features of
  space-related grid and/or vector data,
- the calculation of the similarity of objects with multi-
  dimensional feature vectors including cluster methods,
  fuzzy and neuroalgorithms,
- all aspects of the standards of cellular mobile radio
  telephone networks, the system technology and the
  technology of terminals of cellular mobile radio
  telephone networks, and
- all aspects of models and methods for propagation,
  coverage, interference, frequency demand, frequency
  planning and the capacity of cellular mobile radio
  telephone networks and of the measurement data in the
  operation of a cellular mobile radio telephone network.

Advantageous embodiments and further developments of the
invention are the subject-matter of the dependent patent
claims.

Due to the calculations of similarity between the reference
data and the planning data, which form the basis of the
method, it is possible to assess the quality of the network

design by quantifying the relations between space-related reference and planning data. The quality or, respectively, the correspondence of part-areas of the network design to part-areas of the reference network can be expressed, for example, by a number between 0 and 1, where 0 indicates no correspondence and 1 an identical correspondence between the data of the reference area and the planning area. This enables the network planner to estimate rapidly and relatively accurately the expenditure and the costs of any manual post-processing of the network design found which may be required.

In the text which follows, the invention is explained in greater detail by means of an illustrative embodiment, referring to a number of figures in the drawings. The drawings and their description will reveal further features and advantages of the invention.

Figure 1 shows a diagrammatic representation of the method according to the invention;

Figure 2 shows diagrammatically the structure of the technical implementation of the method;

Figure 3 shows a flow chart of the most important method steps;

Figure 4 generally shows the necessary method steps in the
(part-)automated radio network planning according to the
prior art.

According to the invention, the following considerations are
used as a basis:

Two geographic areas having identical space-related features
can be supplied by mobile radio telephone networks or
subnetworks which are identical apart from the space-related
parameters (coordinates of the base stations, main beam
directions of the antennas). From this it follows that two
geographic areas having identical space-related features can
be represented by identical space-related data contents which
can be processed by machine.

The preliminary considerations are based on the fact that the
number of cellular mobile radio telephone networks which have
been planned and have been implemented by network operators
such as T-Mobil is very large. If, in theory, this number
tends towards infinity, there is already a planning area
having identical space-related data contents for each new
planning area. The mobile radio telephone network existing
locally can be processed for the network design for the new
planning area by transformation of the space-related
parameters.

Assuming a realistic number of planned and implemented mobile
radio telephone networks of a network operator such as

T-Mobil, a planning area with identical space-related data contents already exists for each new planning area precisely if, in theory, the size of the area of the planning area tends toward zero or, respectively, approaches the resolution of the space-related data (e.g. 5 × 5 seconds of arc). The smaller the planning area and the subnetwork connected with this geographical area, the greater the probability that there are identities in the space-related data contents.

The realistic, practical application takes place when the space-related data contents of an existing planning area and a new planning area are considered as being identical by means of the introduction of a similarity criterion. The degree of similarity of the space-related data contents is a quality level of the conformability of the design for the new cellular mobile radio telephone network or subnetwork.

Figure 1 diagrammatically shows the sequence of the method according to the invention.

The space-related planning data of planning area 1 are known. The planning data have been previously determined by means of known methods and measures and can contain the following:
- elevation data,
- land utilization data,
- traffic routes (road data, railway data, shipping lines),

- traffic data (e.g. distribution of traffic volumes in the grid squares 2),

- distribution of subscribers,

- distribution of population

or special, suitable subsets of this total set.

The network data 10 which describe the required network or subnetwork are not yet known and are to be determined by the method.

From radio network planning operations in a planning area 6 considered, which have already been carried out, the network data and parameters are known and represent a corresponding set of reference data which are connected to the planning areas of these preproduced, planned or implemented mobile radio telephone networks or subnetworks via one-to-one relation: these data also contain:

- elevation data,

- land utilization data,

- traffic routes (road data, railway data, shipping lines),

- traffic data (e.g. distribution of traffic volumes in grid squares 7),

- distribution of subscribers,

- distribution of population

or special, suitable subsets of this total set.

This provides reference data which contain both the subset of the network data and network parameters of the preproduced mobile radio telephone networks (e.g. sites of the base stations 9 and resultant field strength distributions 8) and, connected via one-to-one relations, the subset of the space-related data of their planning areas.

According to the invention, operations 13 are now performed which implement a conversion from the state of preproduced mobile radio telephone networks or subnetworks 6 into the state of network design for a new planning area 1.
The part-operations are:

-   Feature calculation of space-related reference and planning data 7 which are represented as one- or multi-dimensional features or parameters.
-   Similarity calculation of multidimensional features of the planning area 1 and the planning area 6,
-   Mapping of the sites of the base stations of reference area 6 onto planning area 1 by coordinate transformation of the sites of base stations 9 into geographical longitude, latitude and rotation related to the zero meridian,
-   Angle transformation of the main beam directions of the antennas of base stations 9 for rotations related to the zero meridian.

This results in a network design which consists of planning
data and parameters of the automatically generated, complete
mobile radio telephone network or subnetwork (site of the
base stations 12, parameters for calculating the field
strength distribution 11, etc.). The more closely the
reference area and its space-related data correspond to the
planning area and its space-related data, the greater the
correspondence of the network data of the network design to
the data of the reference network design.

According to Figure 2, therefore, this results in a method
for automatically designing cellular mobile radio telephone
networks, in which

-       without necessary human intervention,
-       for a mobile radio telephone network or subnetwork N1 to
        be planned,
-       on a geographic area 1,
-       a real or abstract mobile radio telephone network or
        subnetwork N2, on a real or abstract geographic area 6,
-       is changed in the space-related parameters site
        coordinates of base stations 9, 12 and antenna main beam
        directions,
-       and on the geographic area 1 is substituted by
        coordinate transformation of the geographical longitude,
        latitude and rotation with respect to the zero meridian
        in network N1,

-      at the precise instant, when the features of the space-

       related data of the geographic areas 1 and 6 are equal

       or are set to be equal in accordance with a particular

       criterion.

To implement the method according to the invention

technically, computer hardware and software of a radio

network planning tool including the input/output peripherals,

corresponding to the prior art, must be supplemented by

programs for implementing the operations of the method

according to the invention.

Storage media corresponding to the prior art must be provided

for space-related grid and vector data.

Furthermore, storage media corresponding to the prior art

must be provided for planning data and parameters of planned

or implemented cellular mobile radio telephone networks or

subnetworks. The data of the reference data can be called up

in appropriate databases.

Figure 3 again describes the steps of the automated planning

method in detail:

(1) Reading the space-related reference data r1 to rn:

The space-related data of the reference networks (in each

case represented by their space-related reference data and

their reference network data) are accessed.

(2) Calculating features Mr1 to Mrn:

For each reference network ri, i=1 to n, a feature Mri is

calculated. Both general prior art methods of pattern

recognition and data condensation and normalized storage

techniques for the space-related data as matrix or node/edge

vector without special data condensations can be used.

(3) Reading the space-related planning data rp:

The space-related data of the planning area are accessed

(4) Calculating the features Mp:

Calculations according to Step (2) for the space-related

planning data

(5) Calculating feature Mri with the shortest distance to

feature Mp:

The feature Mri (reference network data) having the shortest

distance to feature Mp (planning data) in the feature space

is calculated by using methods corresponding to the prior art

for calculating the similarity of objects having

multidimensional feature vectors (e.g. cluster method).

The associated reference network Nri is determined via index

i due to the one-to-one relation between space-related

reference data and reference network data.

(6) Reading the data of reference network Nri:

The network data and parameters Nr1 to Nrn of the reference network are accessed

(7) Transformation of the site coordinates Nri → Np

Establishing geographic congruence of the space-related reference data i and planning data p by displacement (geographic longitude and latitude) and rotation with respect to the zero meridian. Analogous coordinate transformation of the sites of the base stations (application addition, subtraction, circular function).

(8) Transformation of the main beam directions Nri → Np

Analogously to step (7), transformation of the angles of the main beam directions of the antennas of the base stations with respect to the geographic location from Nri to Np (application of addition and subtraction).

(9) Outputting the data of the network design Np:

Storing the data of the network design Np on the storage medium

Output of the distance of the features Mri (space-related reference data) and Mp (space-related planning data) in the multidimensional feature space as quality level for the conformability of the automatically generated network design Np.

Legend of drawings

1   Planning area

2   Grid square

3   Density points

4   Base station

5   Coverage area

6   Reference area

7   Grid square

8   Field strength distribution

9   Base station

10   Network data to be determined

11   Field strength distribution

12   Base station

13   Operations

Patent Claims

1. A method for automatically designing cellular mobile
    radio telephone networks, wherein, from existing
    planning data of implemented, planned or abstract
    cellular mobile radio telephone networks or subnetworks
    and the space-related data of their planning areas and
    the space-related data of a new planning area, a design
    of the cellular mobile radio telephone network or
    subnetwork for the new planning area is automatically
    generated by processing the relations between the space-
    related reference and planning data and application of
    coordinate and angle transformations to the site
    coordinates of the base stations and main beam
    directions of the antennas of the base stations of the
    reference data.

2. The method as claimed in claim 1, wherein the quality of
    the network design is assessed by quantifying the
    relations between space-related reference and planning
    data.

3. The method as claimed in claim 1 or 2, wherein the
    space-related planning are acquired, stored, tested and
    processed in the known manner.

4.   The method as claimed in one of claims 1 to 3, wherein
       the space-related planning data are represented as one-
       or multi-dimensional features and/or parameters and are
       kept stored in a database.

5.   The method as claimed in one of claims 1 to 4, wherein
       the space-related and network-related reference data are
       kept stored in a database and are represented as one- or
       multi-dimensional features and/or parameters.

6.   The method as claimed in one of claims 1 to 5, wherein,
       without necessary human intervention, for a mobile radio
       telephone network or subnetwork (N1) to be planned on a
       geographic area (1) a real or abstract mobile radio
       telephone network or subnetwork (N2) on a real or
       abstract geographic area (6) is changed in the space-
       related parameters, site coordinates and antenna main
       beam directions and on the geographic area (1) is
       substituted in the subnetwork (N1) to be planned by
       coordinate transformation of the geographic longitude,
       latitude and rotation with respect to the zero meridian
       at the precise instant when the features of the space-
       related data of the geographic areas (1) and (6) are
       equal or are said to be equal in accordance with a
       particular criterion.

Key to figures

Fig. 1

1   Reference data

2   Space-related data

3   Network data

2   Space-related data

3   Network data

4   **Operations**

5   Planning data

6   (Stage 1)

7   Network design

8   (Stage 2)

Fig. 2

1   Storage medium

2   Space-related planning data rp
                  of planning area A1

1   Storage medium

3   Space-related reference data
                     $r_1 - r_n$

1   Storage medium

4   Reference network data
                  Nr1 - Nrn

5   Calculating base of the programs

6   Operations

1   Storage medium

7   Network design N1 for
planning area A1

Fig. 3

1   Space-related reference data r1 to rn

2   Calculating features Mr1 to Mrn

3   Reading space-related planning data rp

4   Calculating feature Mp

5   Calculating Mri with shortest distance to Mp

6   Reading reference network Nri

7   Transforming site coordination, Nri > NP

8   Transforming main beam directions, Nri > Np

9   Outputting Np, outputting quality level

09/646199

Fig. 1
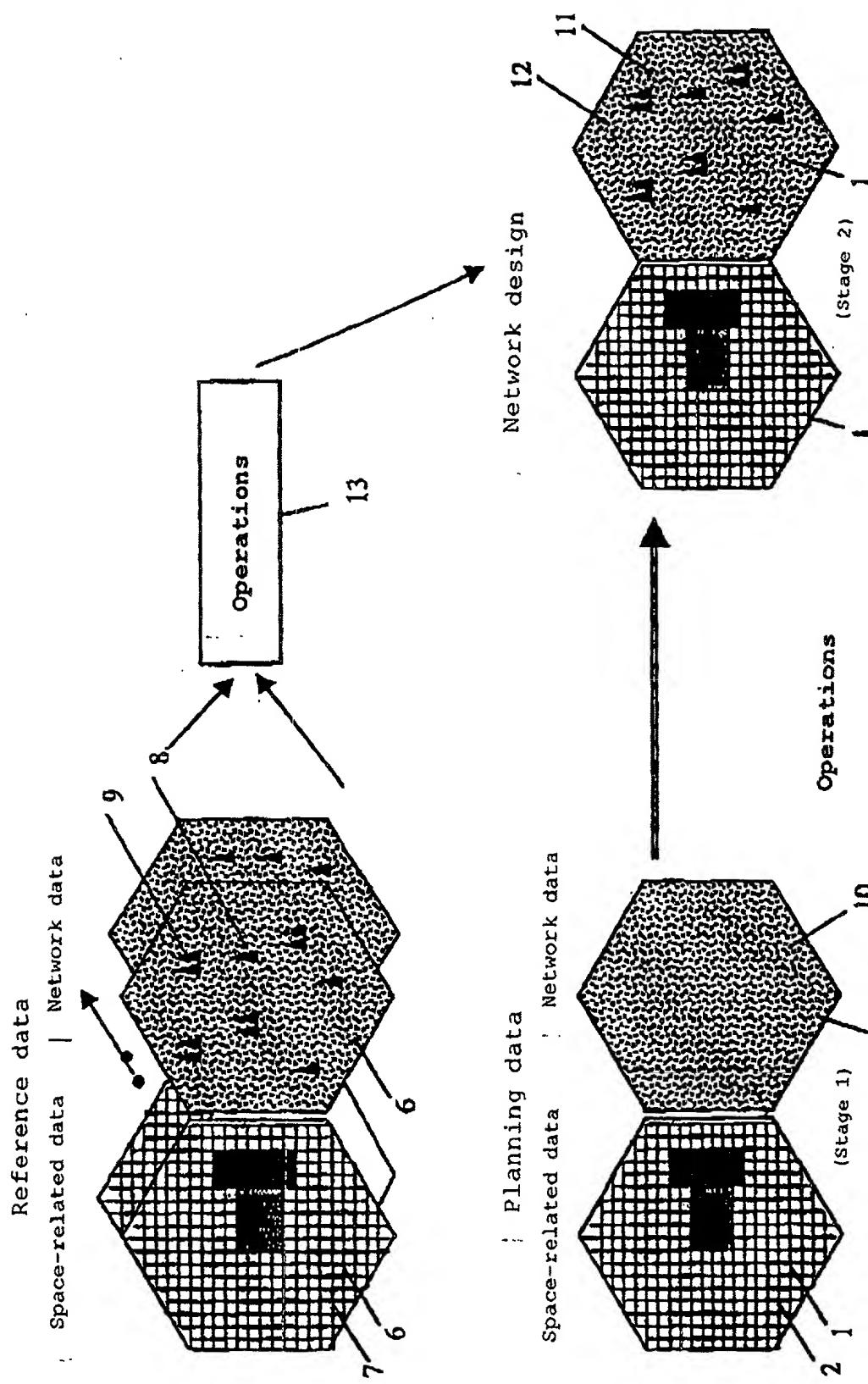
09/646199

Fig. 2

09/646199

Fig. 3

(START)

(1) Space-related reference data r1 to rn

(2) Calculating features Mr1 to Mrn

(3) Reading space-related planning data rp

(4) Calculating feature Mp

(5) Calculating Mri with shortest distance to Mp

(6) Reading reference network Nri

(7) Transforming site coordination, Nri > NP

Transforming main beam directions, Nri > Np

Outputting Np, outputting quality level

(STOP)
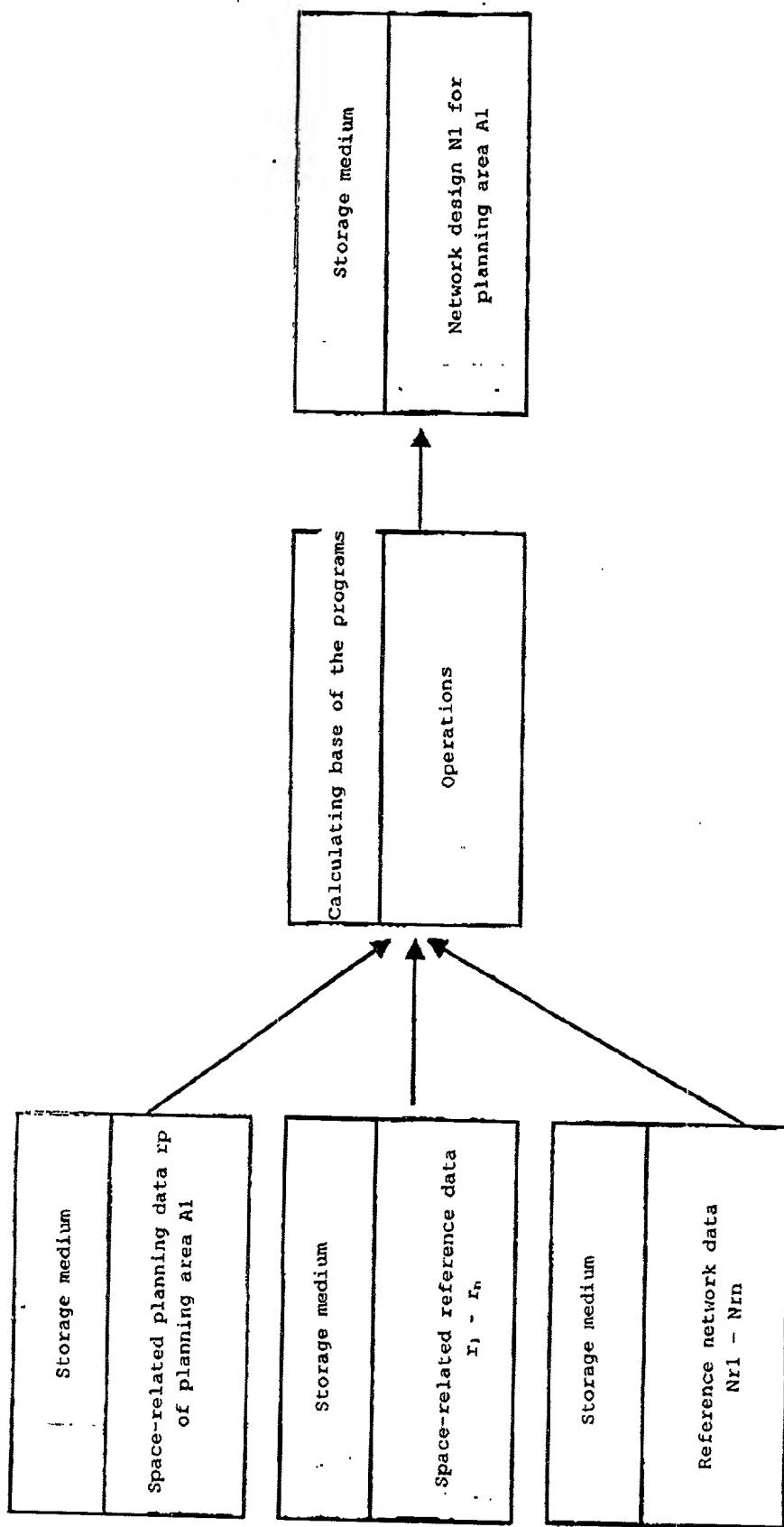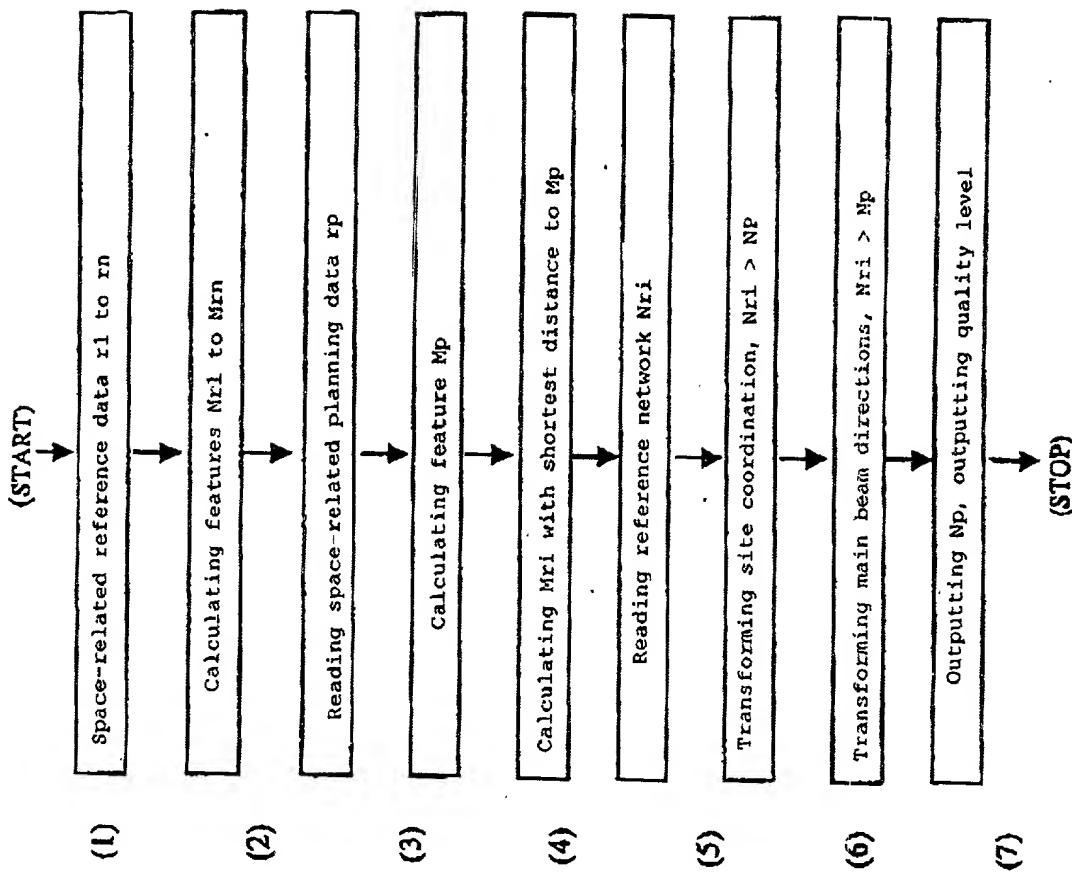
Fig. 4
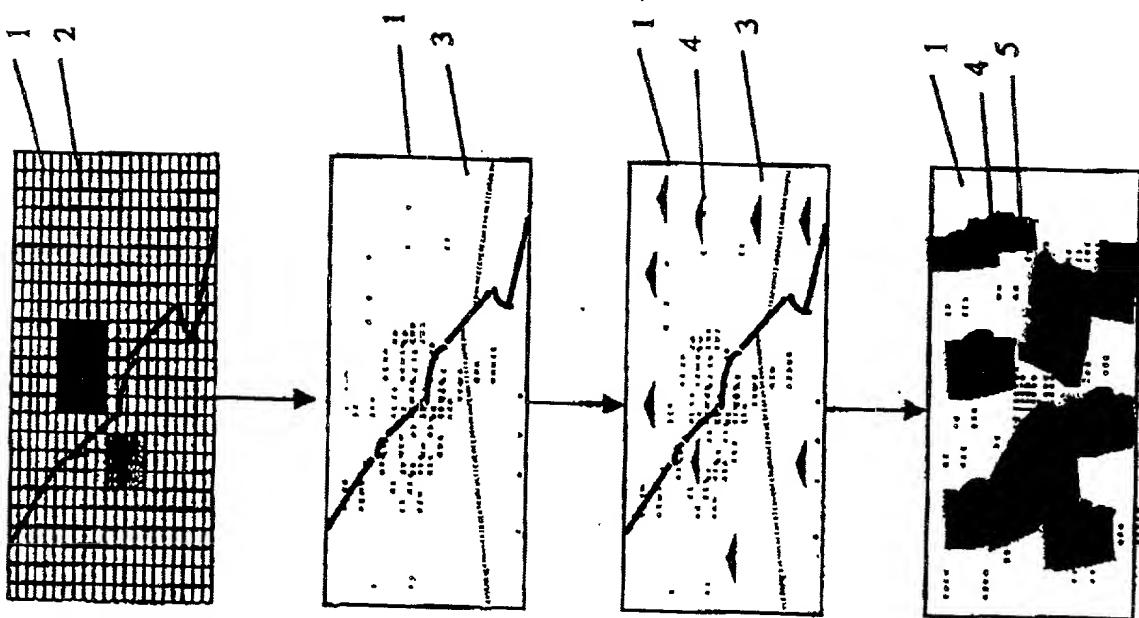
DECLARATION AND POWER OF ATTORNEY

. *As a below-named inventors, We hereby declare that:*

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR AUTOMATICALLY DESIGNING CELLULAR MOBILE RADIOTELEPHONE NETWORKS
(Title of Invention)

the specification of which:
(check one)

_____ *is attached hereto.*

_X_ *was filed on____ September 14, 2000 _____*

Application Serial No.__ 09/646,199 _____

and was amended _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

| Prior Foreign Application(s) | | | Priority Claimed | |
Number	Country	Filing Date	Yes	No
199 01 247.4	GERMANY	January 14, 1999	Yes	____
PCT/DE00/00129	PCT	January 14, 2000	Yes	____

Declaration and Power of Attorney

Application Serial No.	*Filing Date*	*Status*
_____ _____	_____ _____	_____ _____
_____ _____	_____ _____	_____ _____
_____ _____	_____ _____	_____ _____

And I hereby appoint *Norman H. Zivin (Reg. No. 25,385); John P. White (Reg. No. 28,678); Ivan S. Kavrukov (Reg. No. 25,161); Christopher C. Dunham (Reg. No. 22,031); Robert D. Katz (Reg. No. 30,141); Peter J. Phillips (Reg. No. 29,691); and Wendy E. Miller (Reg. No. 35,615) and each of them, all c/o Cooper & Dunham LLP of 1185 Avenue of the Americas, New York, New York 10036 (Tel. 212 278-0400), my attorneys, each with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, to transact all business in the Patent and Trademark Office connected herewith and to file any International Applications which are based thereon under the provisions of the Patent Cooperation Treaty.*

Please address all communications, and direct all telephone calls, regarding this application to:

Norman H. Zivin _____ _Reg. No._ **25,385** _____
Cooper & Dunham LLP
1185 Avenue of the Americas
New York, New York 10036
Tel. (212) 278-0400

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

*Full name of sole or
first joint inventor*_____ _Jurgen CLEMENS_ _____

*Inventor's signature*_____

*Citizenship*_ *Germany* ___ *Date of signature*_ 13 Okt 2000 ___

*Residence*_ *In Neuwerk 11* ___

__ _D-21680 Stade, GERMANY_ DEX

*Post Office Address*_ *SAME AS RESIDENCE* ___

*Full name of joint
inventor (if any)*_____ _Dr. Wolf MENDE_ ___

*Inventor's signature*_____

*Citizenship*_ *Germany* ___ *Date of signature*_ 29 SEP 2000 ___

*Residence*_ *Monheimstr. 29* ___

__ _D-53229 Bonn, GERMANY_ DEX

*Post Office Address*_ *SAME AS RESIDENCE* ___

Declaration and Power of Attorney

3.00

Full name of joint
*inventor (if any)*____<u>Dr. Norbert SCHULTZE</u>

*Inventor's signature*_____

*Citizenship*__<u>Germany</u>_____ __Date of signature___ 29.09.2000

*Residence*_____<s>Sperbergweg 28x</s>____<u>Edith-Stein-Str. 17</u>

_____<u>D-53859 Niederkassel, GERMANY</u>____DEX

*Post Office Address*__<u>SAME AS RESIDENCE</u>